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ABSTRACT

The primary purpose of this study was to establish normative data for the cognitive style behaviors of children from kindergarten through the ninth grade. Approximately 400 students served as subjects. The measures used were a free response pictorial-, a multiple choice pictorial-, and a multiple choice verbal-test. Cognitive style behavior was found to progress developmentally from relational to descriptive to categorical modes for pictorial stimuli and from relational to categorical to descriptive modes of information processing for verbal stimuli. The consequences of individual differences in cognitive styles for school learning were discussed within a developmental framework. (Author)

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A Developmental Perspective of Cognitive Style

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A Developmental Perspective of Cognitive Style

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Objectives

The primary purpose of this study was to establish normative data on three cognitive style instruments for children from kindergarten through the ninth grade. Two secondary purposes were to investigate the extent of individual differences in cognitive style behavior and the consequences of different cognitive style behaviors for school learning outcomes across grade levels.

Theoretical Framework

Individual differences in conceptual modes used by adults to process information and developmental differences in those used by children have been of interest to psychologists for some time (Bruner and Olver, 1963; Gardner, 1953; Inhelder and Piaget, 1958; Kagan, Moss and Sigel, 1960; 1963). More recently, individual differences in similar modes of information processing have been studied in connection with school learning conditions and outcomes (Coop and Sigel, 1971; Denney, 1974; Gray, 1974; Wallach and Kogan, 1965).

Differences in the ways that individuals conceptualize their experiences have been referred to as "cognitive style." Kagan, Moss and Sigel (1963) defined cognitive style as "stable individual differences in modes of perceptual organization and conceptual categorization of the external environment" (p. 74). Kagan et al. identified three styles typically used by intermediate elementary grade children: categorical-inferential (categorical); descriptive-analytical (descriptive); or relational-contextual (relational). Categorical responses entail the use of class labels to categorize information; descriptive responses involve the use of details to categorize information; while relational responses consist of the use of interdependent functional associations among stimuli.

While far from conclusive, there has been some evidence reported which suggests that children tend to progress from relational to descriptive and then to categorical modes of information processing in the course of development (Davis, 1971; Farnham-Diggory, 1972; Hornsby and Olver, 1966; Kagan et al., 1963). The notion of cognitive style rests upon evidence that there are consistent individual differences in modes of information processing across an array of experiences at an age level and its significance for education rests upon evidence that there are systematic consequences for children of different cognitive styles in educational outcomes. It seems reasonable to conclude that the evidence is not in at this time insofar as the educational significance of cognitive style is concerned (Cronbach, 1968; Coop and Sigel, 1971; Gray, 1975).

The impetus for the present study came from the observation that investigators of the effects of experimental conditions on criterion performance of subjects of different styles typically use a median-split on a cognitive style test of the sample at hand to assign subjects to style groups. A considerable amount of precision and explanatory information is lost when a median-split is used rather than normative data for this purpose. The use of a median-split is ironical in this area since cognitive style had its origin in developmental theory and research insofar as the study of children is concerned. One of the reasons that the

median-split has commonly been employed regardless of the age or cognitive ability of the sample has been the continuous revision of instruments and development of new ones (e.g., Davis, 1971; Denney, 1971; Kagan et al., 1963; Robinson and Gray, 1974; Sigel, 1967; Wallach and Kogan, 1965). Even the early normative data of Kagan et al. was based on instruments which have not been used since that time. A possible consequence of the lack of availability of normative data may be the inconsistent findings in the research literature as well as difficulty in making meaningful interpretations of significant results when they do occur.

Method

Approximately 400 students, randomly selected by classrooms at five grade levels, served as Ss. This total consisted of 28 kindergarten, 82 third-grade, 134 fifth-grade, 88 seventh-grade, and 84 ninth-grade students. In addition, 80 ninth-grade students who were not a part of the present sample were used to establish norms for one of the cognitive style tests. There were approximately the same number of boys and girls at each grade level.

The latest form of the Conceptual Style Test (CST) developed by Kagan (1968), a multiple-choice version of the same test (MCCST) developed by Cohen (1972), and a verbal analogies test of cognitive style (ATCS) developed by Robinson (1973) were used in the study as measures of cognitive style. The scores used in this study were the total number of responses used by Ss for each style on each of the instruments. The reliabilities of style scores derived from the CST, MCCST and ATCS are in the high .70's and low .80's for intermediate grade children (Cohen, 1972; Gray, 1974; Robinson and Gray, 1974).

The MCCST was administrated individually to kindergarten Ss. Neither the CST or ATCS was given to kindergarten Ss. The ATCS, CST, and MCCST were group administered in intact classrooms to the remaining Ss. Scores of recently administered standardized ability and achievement tests were obtained for Ss from school records. Lorge-Thorndike Cognitive Ability Test scores were obtained for kindergarten, seventh-grade and ninth-grade Ss. Otis-Lennon Mental Ability Test scores were obtained for fifth-grade Ss. Third-grade Ss had not been administered a recent ability test. Scores were obtained from the Iowa Test of Basic Skills for third-, fifth- and seventh-grade Ss and from the Iowa Test of Educational Development for ninth-grade Ss. Kindergarten Ss had not been administered an achievement test.

Mean IQs ranged from 102 (kindergarten) to 111 (fifth-grade) and variability in deviation IQ units ranged from 13 (fifth-grade) to 15 (kindergarten). Mean performances in general achievement for all grades were slightly above average based on state norms.

Baseline Criteria

Norms for establishing a criterion to compare the performances of Ss across grade levels for the CST and MCCST were obtained from an investigation by Cohen

(1972). As the Ss in that study could be considered to be in the stage of concrete operational thought and to use iconic modes of representation, it seemed reasonable to use these data to establish a baseline criteria for the pictorial CST and MCCST. On the other hand, the ATCS would appear to measure symbolic representations. Thus, it seemed reasonable to obtain scores from Ss who could be considered to be in the stage of formal operational thought and to use symbolic modes of representation. To this end, the ATCS was administered to a sample of 164 ninth-grade Ss of approximately the same mean IQ and variability (Mean of 101 and Standard Deviation of 15) as the fourth-grade Ss used by Cohen.

Based on the above norms, a criterion score of .5 standard deviation units above the mean on a standard score scale (Mean of 50 and Standard Deviation of 10) was used for each of the scales of the three cognitive style instruments to classify Ss at all grade levels into style groups.

Conclusions

A summary of pertinent data is reported in Table 1. The upper third of the table consists of descriptive statistics. Mean performances on the CST indicate that children tend to progress developmentally from relational (grade 3) to descriptive (grade 5) to categorical (grade 9). Similar trends are not discernible for the MCCST. Rather, the discrepancies in mean performances between the CST and MCCST at grades 3, 5 and 9 suggest that structure in the form of multiple-choice alternatives tends to enable Ss to respond at a developmentally more advanced level than they would have been on their own until grade 9. Mean performances, and variabilities on the ATCS indicated that the developmental trend is from relational to categorical and then to descriptive styles of conceptualization. There is evidence that different styles may be used developmentally in the processing of pictorial and verbal information.

The middle third of the table contains the percentage of Ss assigned to style groups at the various grade levels based on the criteria established from norms. There are a sizeable number of Ss at each grade level who would be classified into each style group based on performances for each test. The percentage changes from one grade level to another for each test support conclusions drawn from mean performances.

The lower third of Table 1 consists of correlations between style scores and general school achievement. The direction and degree of relationships between style and school achievement tend to follow the developmental trends discussed above.

Educational Significance

The results of this study indicate that cognitive style behavior undergoes systematic change from kindergarten through the ninth grade. As cognitive style behavior in processing pictorial and verbal information appears to develop differently, caution might be exercised in expecting cognitive style to generalize from one stimulus mode to the other. The frequency of cognitive style at different grade levels suggests that individual differences in styles might be most meaningfully interpreted in a developmental framework.

Table 1

Summary of Normative Data, Percentages of Individuals Assigned To Style Groups Based on Specified Criteria, and Correlations Between Cognitive Style and School Achievement Across Developmental Levels[a]

			ATCS			CST			MCCST		
Grade	N		C	D	R	C	D	R	C	D	R
9	84	M	14.3	13.3	13.6	7.5	8.1	3.4	8.3	6.0	4.7
		SD	1.7	2.0	1.9	4.4	3.9	2.4	3.8	4.2	2.8
7	88	M	14.9	12.8	13.4	6.8	8.8	3.3	9.2	4.9	4.9
		SD	2.4	2.2	2.1	4.6	5.3	3.0	3.9	3.4	2.7
5	134	M	14.9	12.6	13.4	5.3	10.5	3.2	8.1	6.9	3.9
		SD	2.7	2.6	2.7	3.4	4.2	2.3	3.8	3.7	2.8
3	82	M	15.4	10.6	14.1	3.9	8.9	6.4	6.9	7.5	4.7
		SD	4.5	3.3	3.6	3.4	4.9	4.6	3.3	3.5	2.9
K	28	M							5.1	8.7	5.3
		SD							3.5	5.3	3.2

			C	D	R	O	C	D	R	O	C	D	R	O
9	84	%	19	23	12	46	44	19	18	19	21	22	35	22
7	88	%	40	27	12	21	22	40	17	21	28	23	33	16
5	134	%	37	19	11	33	28	44	11	17	27	39	16	18
3	82	%	42	05	29	24	17	20	35	28	17	36	22	25
K	28	%									19	29	25	27

			C	D	R	C	D	R	C	D	R
9	84	r	.05	.26	-.19	.40	-.25	-.33	.12	.08	-.29
7	88	r	-.04	.32	-.02	.64	-.49	-.12	.39	-.20	-.31
5	134	r	-.04	.44	-.25	-.01	.19	-.33	.38	-.28	-.14
3	82	r	.13	.21	-.04	-.04	.34	-.22	.07	-.17	.13
K	28	r							-.19	.17	-.08[b]

[a] The notations C, D, R and O represent categorical, descriptive, relational and other respectively.

[b] Performances on the Lorge-Thorndike Cognitive Abilities Test.